

**OIL & GAS DEVELOPMENT COMPANY  
LIMITED**



**TENDER ENQUIRY NO. PROC-SERVICES/CB/WL-4799/2020**

**FOR ACQUIRING OF MUD LOGGING SERVICES ON RATE RUNNING**

**Note:**

Bid bond of **USD 22,000/- (US Dollar Twenty Two Thousand Only)** must be submitted with the technical bid. Please see tender documents for further detail.

The master set of tender documents (services) uploaded on OGDCL website ([www.ogdcl.com](http://www.ogdcl.com)) is the integral part of this TOR.

**TERMS OF REFERENCE (TOR)**  
**FOR ACQUIRING OF MUD LOGGING SERVICES**  
**ON RATE RUNNING FOR A PERIOD OF TWO YEARS**  
**EXTENDABLE ON MUTUAL CONSENT**

**INTRODUCTION**

- WELL NAME** : Any of OGDCL Wells and operated JV  
Wells likely to be drilled from Jan, 2021  
to Dec, 2022.
- TARGET DEPTH** : (+/-) 600M to (+/-) 6000M (Approx.)
- NO OF DRILLING DAYS** : (+/-) 30 Days to (+/-) 360 Days (Approx.)
- AREA** : Anywhere in Pakistan (Balauchistan,  
Khyber Pakhtunkhuwa, Punjab, Sindh)
- LOCATION** : Anywhere in Pakistan (Location Map will  
be provided)

**2. SCOPE OF WORK**

Oil and Gas Development Company Limited (OGDCL) has planned to drill 45 on-shore wells in 2020-21, pace of work may increase in 2021-22 and 2022-23.

COMPANY plans to hire the Mud Logging Services with fully operative Mud Logging Unit(s) manned with fully experienced & fully qualified (05) Five Men crew per unit on **Rate Running Contract** purely on "**Call out Basis**" for Shallow, Medium and Deep wells planned to be drilled in 2021-22 and 2022-23.

OGDCL intends to enter into Rate Running Contract with internationally reputed Mud Logging Contractors to acquire their services purely on "Call out basis and wherever required in Pakistan", **primarily for a period of 02 years extendable on mutual consent.**

The CONTRACTOR shall sign an agreement with the company to provide fully operative Mud Logging Unit(s) with fully experienced and fully qualified (05) Five Men crew per unit, "on Call out basis and wherever required in Pakistan-basis", during the contract period, in accordance with good industry practice and TOR. The services will be imparted utilizing state of the art technologies in most efficient manner without any kind of deviation to the TOR (Term of Reference). The contractor may be offered further jobs, on completion of the assigned work, subject to his quality of work performance on this particular assignment.

The CONTRACTOR, after signing the contract agreement with the company, is legally & morally bound to provide the fully operative Mud Logging Unit(s) & fully trained Five Men Crew per unit to perform the services as per "TOR" and requirement of the company, within 30(Thirty) days mobilization notice period for the unit(s) & crew(s) from abroad and 10(Ten) days mobilization notice for the unit(s) & crew(s) in Pakistan. In case of his inability to meet the time constraint, the company reserves its right to impose Delay Penalty of 25(Twenty Five) percent of the established day rate of the contract for each day of delay with effect from the desired date advised through mobilization notice and or Contract award, whichever is later, nearer the time for the period of 30(Thirty) days and the COMPANY shall thereafter have the right to terminate the contract and or take legal action in accordance with the terms of a mutually signed agreement.

The CONTRACTOR should have the availability of not less than 02 Mud Logging units in Pakistan.

The COMPANY shall provide sufficient quantum of work in accordance with its drilling program on Call out and wherever (in Pakistan) required basis **without any kind of guarantee for minimum scope of work.** The contractor should be ready to meet all requirements outsourced by the company, and therefore, make available adequate resources for this purpose. But the COMPANY is not bound to take any kind of obligation(s) for grant of job(s) or any other business to the CONTRACTOR during the contract period.

### **3. TECHNICAL BID**

OGDCL would require Latest Model fully air-conditioned skid mounted Online Mud Logging Unit(s) not more than Five (05) years old along-with required sensors and instrumentation installed on the Rig to be explosion proof and part of intrinsically safe system (Zener Barrier) or galvanically isolated barriers with the following capabilities.

#### **3.1 Online recording and display of following Drilling Parameters**

- Depth and rate of penetration,
- Hook load,
- Weight on bit,
- Rotary speed (RPM)-Top Drive or Rotary Rig(s)
- Rotary Torque- Top Drive or Rotary Rig(s)
- Standpipe pressure
- Pump stroke counter –SPM, (3)
- Casing pressure/Wellhead Pressure.

#### **3.2 Online Recording and Display of following Mud Parameters**

- Mud weight in and out, (0-3 S.G.)
- Mud temperature in and out, (0-100°C)
- Mud conductivity in and out, (0- 300 ms)
- Mudflow out (0- 100 %)
- Trip tank volume
- Mud pit volume (08 pits, active or reserve)
- Magnetic flow meter (Optional)

#### **3.3 Online Gas Recording, Analysis and Evaluation**

- Gas Trap,
- Total gas detector (0-100%)
- Gas chromatograph (Analysis time 60 seconds for C1 through C5)
- Cutting gas detection
- H<sub>2</sub>S monitoring sensors at minimum 4 places, (Range 0-100ppm)
- CO<sub>2</sub> monitoring, (Range 0-100%)
- N<sub>2</sub> Detector (Range 0-100%)

Alarm will be set on measured parameters, as required by drilling conditions or as per Company's Representative advice. Unit should be capable to receive independent signals on Computer, Online recorder or online printer and Digital Panel Meter from all sensors to avoid data loss in case of computer failure.

### 3.4 **Formation Evaluation Sample collection description and interpretation**

- Geological section containing all kind of equipment for processing the Samples. Sink, Drying Oven, Fluoroscope, all kind of processing equipment for cuttings (cutting trays, sieves, watch glass, test tubes, funnel, etc.) binocular microscope (Magnification from 10X to 90X along with digital camera), glassware and Calcimeter, shale density measurement kit, all kind of Chemicals required for geological analysis of cuttings or cores and core boxes etc.
- 3.5 Formation Pressure Analysis “D” Exponent, Formation pressure gradient, Shale density.
- 3.6 Remote video monitor for Rig floor (Explosion proof), Company Man’s Office, Rig Manager’s Office and Wellsite Geologist’s office.
- 3.7 Intercom system (5 units) between Logging Unit, Rig Floor (Explosion Proof), Mud cabin (Explosion proof), Wellsite Geologist, Rig Manager and Company Man offices.
- 3.8 The unit must be equipped with transformer, voltage stabilizer, zenamic line barriers and UPS to accommodate any kind of rig power fluctuations and to provide minimum of 30 minutes back up, in case of rig power failure.
- 3.9 All possible spares, extra power cables to coupe with any unforeseen rig power fluctuations.

## 4. **On-Line Real Time Data Acquisition System**

Real time data acquisition of drilling, mud and gas parameter versus depth and time, screen display, and real time plotting/printing, Tripping monitor,

Full library of software programs to help the Drilling supervisor, Geologist, Driller & Mud engineer.

**Drilling Assistance** Covers such applications as blowout control, deviation surveys, hydraulic optimization, bit costs, surge and swab, drilling reports.

**Abnormal Pressure Detection**, to analyze parameters such as Dc-exponent, formation pressure gradient increasing or decreasing trend, shale densities, etc.

**Gas Logging**, containing chromatographic analyses, gas composition diagrams, gas reports, hydrocarbon evaluation.

**Geology** enables automatic tracing of the Master log, lithology columns. Format of Master Log, Gas Log, Pressure Log and Core Log will be provided before spud in the well.

## 5. Data Engineering – Applications Software

The software library includes the following or similar packages:

<b>Drillpack:</b>	Hydraulic optimization (Complete Mud Hydraulic Analysis) Kick control Advanced Kick and Kill analysis Buoyancy effect Trip Program Swab and Surge Bit cost Bit Optimization and cost analysis Drilling report etc. Fracture Gradient Analysis Cutting Slip Velocity Calculations Casing Running Control Directional Survey/Well Deviation Analysis
<b>Gaspack:</b>	Chromatolog Gas Composition diagram Gas Ratio analysis
<b>Deviation:</b>	Plot plan view Plot cross section Plot 3-dimensional section
<b>D-exponent:</b>	Overpressure detection Plot on screen/printer/plotter List on printer
<b>Casing list:</b>	List on printer Plot on screen
<b>Masterlog lithology:</b>	Lithology symbols Casing and core data Plot on screen/printer
<b>Bit performance:</b>	Bit cost chart

## 6. Backup of Spares & consumables

Enough backup spares & consumables should be available in separate storage container to cover all kind of rig up accessories, corrective and preventive maintenance and to face the most common failures. **The cost of spares is included in daily operating charges.**

7. **Calibration & Equipment Maintenance Requirements will be provided by the Contractor**

This requirement pertains to all sensors with emphasis being placed on Gas Detectors, Pressure Transducers and Mud Weighters. Calibrations are to be performed on a daily basis. A calibration spreadsheet will be provided on which the vendor will record calibration results. This spreadsheet is to be faxed or mailed as per instruction of the Well site Geologist or Company's Representative.

**TOTAL GAS-FID TOTAL HYDROCARBON DETECTOR:**

Variation in the equipment used to capture a sample of ditch gas, and transport it to the data unit total gas detector, precludes the implementation of a true standard. Calibration procedure and nomenclature should however be consistent in all cases. Calibration is by means of passing certified concentration methane-in-air into the detector. A certified concentration of 100% Methane in air must be available for calibration purposes.

1. **Calibration Procedure**
  - a. Zero with 100% air
  - b. Three-Point Calibration span with concentration of 1%, 3%, 10%, Methane in air. If gas show in excess of 10% are a regular occurrence, the calibration procedure should be designed to test high range response and sample dilution Accuracy.

**Equipment Maintenance**

- a. Inspect Gas Trap daily and clean as needed.
- b. Check calibration every 12 hrs.
- c. Blow back lines every 6 to 12 hours and when needed.
- d. Drain and inspect sample pump and drier assembly daily.

**CHROMATOGRAPH**

Two Calibration mixtures should be available, each containing C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, iC<sub>4</sub>, nC<sub>4</sub>, iC<sub>5</sub>, nC<sub>5</sub>, with a balance of air or nitrogen.

Low Range Mixture	High Range Mixture
1.00% C <sub>1</sub>	10.00% C <sub>1</sub>
0.25% C <sub>2</sub>	2.5% C <sub>2</sub>
0.25% C <sub>3</sub>	2.5% C <sub>3</sub>
0.25% iC <sub>4</sub>	2.5% iC <sub>4</sub>
0.25% nC <sub>4</sub>	2.5% nC <sub>4</sub>
0.25% iC <sub>5</sub>	2.5% iC <sub>5</sub>
0.25% nC <sub>5</sub>	2.5% nC <sub>5</sub>

The Calibration and check should be similar to those used for the Total Gas Detector Standards.

**CALCIUM CARBIDE PERFORMANCE CHECK**

Carbide tests will be performed not less than once per logging day or once per 250M of hole or as advised.

### CARBON DIOXIDE DETECTOR (0-100%)

CO<sub>2</sub> detector will be calibrated by establishing response at three points, with pure air (zero) and with two CO<sub>2</sub> certified gas mixtures (1% and 10%). Check once per logging day.

### HYDROGEN SULPHIDE DETECTOR (0-100 ppm)

All the four H<sub>2</sub>S sensors will be calibrated by establishing response at three points, with pure air (zero) and with two H<sub>2</sub>S certified gas (5ppm /10ppm / 50ppm). Check once per logging day.

### NITROGEN DETECTOR (0-100%)

N<sub>2</sub> detector will be calibrated by establishing response at three points, Check once per logging day.

### MUD WEIGHTERS

*Buoyancy Type:*

1. Calibration Procedure
  - a. Zero with weighted ball suspended in air.
  - b. Span with weighted ball suspended in mud to scale mud weight reading.
2. Equipment Maintenance
  - a. Check calibration with every weight increase
  - b. Clean and inspect sensor daily

*Differential Pressure Type:*

1. Calibration Procedure
  - a. Mount sensor vertically in air to set ZERO/LOW point.
  - b. Place sensor vertically into fresh water to set SPAN/HIGH point.
2. Equipment Maintenance
  - a. Check calibration with each weight increase.
  - b. Clean and inspect sensor daily.



## STANDPIPE PRESSURE / CASING PRESSURE TRANSDUCERS

### 1. Instrument Shop Calibration Procedure

Transducers will be tested over full (0- ,1000 psi) for accuracy and linearity. Applied pressure should be measured by means of a certified Heise precision gauge, or equivalent device calibrated and certified to N. B. S standards. All results must be within transducer manufacturer specifications for acceptance. A record of each calibration must be maintained for future reference.

Representative specifications for an instrument shop calibration standard are:

Model/Type Heise Gauge, Cm, 12", 0-10,000 psi.

Certification Each gauge supplied with certified copy of test results and calibrated to N. B. S. standards.

Accuracy +/- 0.1% of full scale reading.

Sensitivity 0.01% of full scale.

Repeatability 0.02% of full scale.

Hysteresis Not greater than 0.1% of full scale.

### 2. Field Calibration Procedure:

A field kit should be available to permit comparison between transducer readings and a calibrated, certified reference standard (pressure gauge or dead weight tester). A 0 to 10,000 psi range is acceptable for field use. When removed from its normal location and installed on the test kit, the transducer should be reconnected to the logging unit sensor cable. The objective is to test the whole system in circumstances as close to normal operations as possible. The test should cover the complete range of the test reference standard, with special emphasis being paid to the 0 to 1,000 psi range. Readings registered on the digital meter in the logging unit and corresponding gauge readings must be recorded and kept for future reference. A desirable feature for the test manifold is the ability to mount rig gauges to test their calibration against the reference pressure standard and the logging unit equipment.

Representative specifications for a rig calibration standard are:

Model/Type Marsh Master Test, 6969.15

Certification each gauge supplied with certified copy of test results.

Accuracy +/- 0.25% of full scale reading.

### 3. Equipment Checks and Maintenance

#### a. Inspect daily.

When possible obtain the record comparisons with rig gauges (driller's console, cementing unit, choke control unit, etc)

Do not change calibration to match rig gauges. If there is a significant difference, and the above calibration procedure has been adhered to, contact the well site geologist/Company Representative for instructions.

## **8. End of Well Report Requirements**

- 8.1. The COMPANY will not accept erroneous End of Well Report (EOWR) in any case.
- 8.2. Special emphasis **MUST** be given to the accuracy of all kind of data, tables, charts, graphs, spellings, page to page grammar, paragraphs, font size, margins, presentation, etc, etc, of the EOWR.
- 8.3. The compilation and editing of EOWR will be made by the Contractor's designated Unit In charge in consultation with the Company's Representative at site on daily basis. The EOWR should remain up to date at all times.
- 8.4. Duly corrected & edited printout of EOWR alongwith soft copy should be mailed by the Contractor's representative through fast & safe Courier to Manager Mud Logging on the day the unit is declared released.
- 8.5. Red entries may be made for the essential data of EOWR which is not readily available at site, but mandatory required to be included in the report before final printouts.
- 8.6. The Header page of the report (minimum ten copies in original) should be duly signed by the Wellsite geologists and contractors representatives over their names and designations.
- 8.7. A written intimation to Manager Mud Logging regarding all kind of dispatches from well site will be the responsibility of the contractor's rep. in coordination with the wellsite geologist.
- 8.8. If EOWR is not received within three days of unit release date, a penalty @ US\$100/day for each day of delay will be imposed on invoice.
- 8.9. Properly corrected & edited "End of Well Report" complete in all respects should be submitted to the COMPANY within 15 days of well completion (at least 5- Sets, but not limited), else penalty @ US\$100/day of each day of delay will be imposed on invoice.
- 8.10. In case extraordinary errors or omissions are found in the EOWR which will be notified to the contractor in writing, the COMPANY reserves the right to deduct on invoice the time charges @ US\$100/person/day of the company's professionals deployed for editing of the report.

## 9. CONTRACTOR'S PERSONNEL REQUIREMENTS

- **Following Personnel will be required essentially.**

**9.1. One Pressure Engineer ( Only Pakistani Nationals are acceptable)**

Duly Qualified Pressure Engineer having at least 5(Five) years exclusive experience in Pressure Engineering having at least 4 year university degree in earth sciences preferably in Geology or M.Sc. Geology and able to communicate in English fluently (both spoken & written).

**9.2. Two Mud Loggers (Only Pakistani Nationals are acceptable)**

Duly Qualified Mud Logger having at least 2(Two) years exclusive experience in Mud Logging Techniques having at least 4 year university degree in earth sciences preferably in Geology or M.Sc. Geology and able to communicate in English fluently (both spoken & written).

**9.3. Two Sample Catchers (Only Pakistani Nationals are acceptable)**

Duly Qualified Sample Catchers/Trainee Mud Loggers having at least 4 year university degree in earth sciences preferably in Geology or M. Sc. Geology and able to communicate in English fluently (both spoken & written).

9.4. The unit will be manned and monitored with the above crew on 24 hours day basis.

9.5. Crew change is based on 28/28 or 21/21 rotations or as dictated by operational conditions.

9.6. All kind of Crew transportation (cost of Air Tickets, pick & drop, etc) to and from the work location under written intimation to the Company's Security Department and Mud Logging Department, at least, one week in advance, will be the sole responsibility of the Contractor in accordance with the laid down procedure of the company and Government of Pakistan.

9.7. **If needed be**, provision of copy of valid security clearance papers of Contractor's Crew, provision of copy of valid work visas AND at least two weeks prior written intimation to the local administration of the area of work, e.g. Regional Coordinator of the Company, District Police Officer, District Coordination Officer, Political Agent or any other Government Agency or Government Representative, etc, etc. will be the sole responsibility of the Contractor under a written copy to the Mud Logging Department.

9.8. The Contractor should have an effective liaison with the COMPANY on daily basis to discuss any kind of operational issues and resolve them accordingly.

9.9. The COMPANY will not compromise on crew competency, communication skills (both spoken & written English), specified qualification, specified relevant work experience, equipment performance, accuracy of data, etc

- 9.10. The CONTRACTOR is bound to include Personnel's Resumes along-with their fresh colored photographs and COMPANY reserves the right to lock the resumes for future reference.
- 9.11. If any incompetent person of CONTRACTOR is found deployed with the unit, the COMPANY reserves the right to deduct on invoice 100% of the established personnel day rate for that specific category (Pressure Engineer or Mud Logger or Sample Catcher) for each day till such time that its suitable replacement is physically provided by the CONTRACTOR at contractor's own expenses.
- 9.12. The CONTRACTOR is bound to provide the resumes of each crew member on each crew change.

**10. OPTIONAL SERVICES**

The CONTRACTOR must be capable of providing optional service (if required) on demand of COMPANY.

**a) Real time Data Transmission**

**11. FINANCIAL REQUIREMENTS**

- 11.1 **Mobilization** charges of Mud Logging unit. (Please refer financial Bid)
- 11.2 **Demobilization Charges** of Mud Logging Unit (Please refer financial Bid)
- 11.3 **Holding and Standby Charges** of equipment will NOT be applicable in any case.
- 11.4 **Holding and Standby Charges** of crew will NOT be applicable in any case.
- 11.5 **Personnel Mob and Demob** will be solely on CONTRACTOR'S account in all cases.
- 11.6 **Installation Charges** will be paid for 3-days of the established day rate of personnel only by excluding the equipment charges.
- 11.7 **Dismantling Charges** will be paid for 2-days of the established day rate of personnel only by excluding the equipment charges.
- 11.8 **Production Testing Charges** If needed, the unit may be engaged during Production Testing/DSTs with Two Mud Loggers only, working 12hrs/day shift duty to monitor gases and other parameters. (Please refer financial Bid).
- 11.9 The payment will be made 100% in equivalence to Pak Rupees against verified invoices only.
- 11.10 **Operational Day Rental** includes all kind of consumables for the well including (but not limited) the regular stationary items, computer stationary, paper & cartridges, all kind of Gas cylinders, chart rolls, pens, sepias, disks, CDs, dry & wet sample bags, envelopes, Dry & Wet Sample Boxes (Wooden or Standard hard plastic), any kind of Gunny Sacks or other material is strictly prohibited, geochemical tins, bactericide, Standard Core Boxes (Wooden or Hard Plastic), all kind of the core packing material. Any other operational requirement which might be overlooked will be solely on CONTRACTOR's account only.

**12. SELECTION CRITERIA:**

Selection of Contractor will be based on following:

- 12.1 Conformity with Technical requirements and Scope of work as per TOR.
- 12.2 Financially Lowest bidder.

Please submit Technical proposal & Financial proposal for required services in two separate sealed envelopes duly marked **TECHNICAL BID & FINANCIAL BID** with bidder's name.

**13. FINANCIAL BID FORMAT FOR MUD LOGGING SERVICES**

		All Costs in US Dollars
SR. NO.	DESCRIPTION	COST
1	Equipment Mobilization charges (Lump Sum) One Time Only	US\$ _____
2	Equipment Demobilization Charges (Lump Sum) One Time Only	US\$ _____
3	Logging Time Charges (Equipment) charges (365 days for calculation)	US\$ _____/Day Total for 365 days US\$ _____
4	<b>Personnel Charges</b> One Pressure Engineer Two Mud Loggers Two Sample Catchers (365 days for calculation)	US\$ _____/Day US\$ _____/Day Each US\$ _____/Day Each  Total for 365 days US\$ _____
5	<b>Installation Time Charges</b>  (3 days)	US\$ _____/Day  Total for 3 days US\$ _____.
6	<b>Dismantling Time Charges</b>  (2 days)	US\$ _____/Day  Total for 2 days US\$ _____.
7	<b>Optional Services</b> -Real-time Data Transmission	US\$ _____/Day
8	<b>TOTAL ESTIMATED MUD LOGGING CHARGES (Inclusive of all applicable Taxes, duties and levies etc. except PST on services)</b>	US\$ US\$ _____

Note:- Financial evaluation will be carried out on the items mentioned at Sr.#1 to 6.

### **13. FINANCIAL BID FOR MUD LOGGING SERVICES**

- 13.1. All consumable charges are included in day rate. It covers all kind of consumables usually required for the whole Mud Logging operations of the well, including (but not limited) the regular stationary items, computer stationary, paper & cartridges, all kind of Gas cylinders, chart rolls, pens, sepias, disks, CDs, dry & wet sample bags, envelopes, Dry & Wet Sample Boxes (Wooden or Standard hard plastic), any kind of Gunny Sacks are not allowed, geochemical tins, bactericide, Standard Core Boxes (Wooden or Hard Plastic), all the core packing material. Any other operational requirement which might be overlooked will be solely on CONTRACTOR's account only.
- 13.2 The payment will be made 100% in equivalence to Pak rupees only.
- 13.3 The Company shall NOT pay any kind of standby or Holding charges to the contractor for any idle periods, equipment downtime, scheduled maintenance, however, 3-days installations time charges and 2-days dismantling time charges will be paid as per the established day rate of the personnel only by excluding the equipment charges.
- 13.4 The company shall NOT pay any kind of Crew Mob/Demob charges in any case.
- 13.5 Well to Well movement of equipment only will be arranged by the Company.
- 13.6 Contractor shall bear full costs of the following:
  - 13.6.1 Adequate insurance coverage to be taken out and kept in full force and effect for the full duration of the contract to cover all of contractor's liabilities under the contract.
- 13.7 The Contract will be awarded to technically qualified and financially lowest bidder.



**Note:** Bidders are requested to confirm YES/NO only at Table -01 to Table -05.

#### **14 CONTRACTOR'S CONFIRMATION**

<b>TABLE 1: GEOLOGICAL SERVICES</b>		
<b>ITEMS</b>	<b>DESCRIPTION</b>	<b>YES/NO *CONTRACTOR TO SPECIFY</b>
1	Contractor will be solely responsible for Collecting, washing, drying, bagging, labeling, storage and dispatch of cuttings and other samples (minimum 5 Sets, but not limited) to G & R Lab Islamabad, packed in standard strong wooden or hard plastic sample boxes,(sacks not allowed). Similarly the Contractor will be solely responsible for collection of core, description, packing in standard core packing material & standard strong wooden or hard plastic core boxes and dispatch of core to G & R Lab Islamabad (Coring will be as per well situation and core boxes along-with core packing material to be provided by the contractor at its own expenses).	
2	Full Geological description of all cuttings and core samples including fluoroscopic examination using appropriate solvents for detection of hydrocarbons.	
3	Evaluation and interpretation of Lithology. Integration of all available geological/drilling data on a formation Evaluation log and in the final report.	
4	Provision of Well Master Log/Pressure Log/Core Log, Gas Log, etc.	
5	Provision of Daily Geological & Mud Logging Report complete with all pertinent data. Optimization of Well Hydraulics, suggestions to improve ROP and to overcome pipe sticking situations in consultation with relevant cross disciplined professionals at site.	
6	Special emphasis MUST be given to the accuracy of data, tables, charts, graphs, spellings & page to page grammar of the EOWR.	
7	Calcimetry	
8	Cutting Gas Detection	
9	H <sub>2</sub> S Detection (0-100ppm)-with at least four sensors	
10	CO <sub>2</sub> Detection (0-100%)	
11	N <sub>2</sub> Detection (0-100%)	
12	Total gas and chromatographic breakdown of gases including methane (C <sub>1</sub> ), ethane (C <sub>2</sub> ), propane (C <sub>3</sub> ), iso-and normal-butane (iC <sub>4</sub> & nC <sub>4</sub> ), and (iC <sub>5</sub> & nC <sub>5</sub> )	

<b>TABLE 2: PRESSURE DETECTION SERVICES</b>		
<b>ITEMS</b>	<b>DESCRIPTION</b>	<b>YES/NO *CONTRACTOR TO SPECIFY</b>
1	Shale Density/Bulk Density	
2	Calculation of D-Exponent, Corrected D-Exponent,	
3	Pore Pressure Trends, Pore Pressure Gradient	
4	Production of Pressure Evaluation Log	

<b>TABLE 3: DRILLING DATA SERVICES</b>		
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>YES/NO *CONTRACTOR TO SPECIFY</b>
1	Drilled depth	
2	Rate of Penetration (minute per meter or min/ft)	
3	Traveling block position/speed indicator	
4	Weight on bit/hook load indicator	
5	Rotary R.P.M (Top Drive or Rotary Rigs)	
6	Rotary Torque (Top Drive or Rotary Rigs)	
7	Rotating Hours On Bit	
8	Mud pump stroke counter (3 X Triplex pumps on rig)	
9	Pit level monitoring with alarms (total, active & reserve pits-8 pits)	
10	Trip tank monitoring with alarms	
11	Pit Volume Totalizer with alarms (all active and reserve pits)	
12	Standpipe pressure monitor/Shut In Drill Pipe Pressure	
13	Choke Line Pressure Monitor/Shut In Casing Pressure	
14	Mud flow out with alarms	
15	Mud weight In and Out with alarms	
16	Mud Temperature In and Out	
17	Mud Resistivity In and Out	
18	Hydraulics package (including Power Law, Newtonian, Bingham Plastic calculations and including E.C.D.s)	
19	Bit Cost-Per-Meter analysis (including plots)	
20	Pore pressure estimation	
21	Fracture Gradient estimation	
22	Kick Calculation Package (including kick margins)	
23	Surge/Swab Analysis	
24	Tripping Log	

<b>TABLE 4: COMPUTING FACILITIES</b>		
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>YES/NO *CONTRACTOR TO SPECIFY</b>
1	Fully Computerized, latest model data acquisition system less than 05 years old, with a minimum of 2 screen displays, 2 printers / plotters and digital back-up recorders within the unit itself capable of recording “ <b>Primary</b> ” and “ <b>Secondary</b> ” Measurements	
2	Basic On-Line computation of pressure detection parameters	
3	Continuous monitoring and plotting of all rig functions on meter and average depth basis	
4	Off-Line storage (minimum 2 hard discs) and output backup	
5	Continuous CRT display of user-specified functions	
6	On-line explosion proof Colored monitor on the rig floor	
7	On-line Colored monitor for Company Man’s, Mud Engineer’s, Rig Manager’s & Geologist’s office	
8	All computers to be protected by UPS	

<b>TABLE 5: MUD LOGGING UNIT (S)</b>		
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>YES/NO *CONTRACTOR TO SPECIFY</b>
1	Computerized and ruggedised Mud Logging Unit not older than five years with sensors and instrumentation installed on the Rig to be explosion proof and part of intrinsically safe system (zener barrier) throughout.	
2	Skid mounted steel housings, fully insulated. Cabling should cater for Mud Logging unit up to 75m from drill floor and 150m from company Man’s, Rig Manager’s, Mud Engineer’s and Geologist’s office	
3	Availability of Mud Logging Unit(s) in Pakistan	

**Note:** Reasonable spares and consumables necessary for maintaining equipment in good and safe working order will be available at all times. The cost will be included in daily operating charges.

**TABLE 6: DEFINITIONS OF PRIMARY AND SECONDARY MUD LOGGING MEASUREMENTS**

<b>Gas Measurements System</b>	Total Gas Chromatographic breakdown of gases including Methane (C <sub>1</sub> ), Ethane (C <sub>2</sub> ), Propane (C <sub>3</sub> ), Iso and Normal Butane (iC <sub>4</sub> & nC <sub>4</sub> ), Pentane (C <sub>5</sub> ). Cutting Gas Detection H <sub>2</sub> S Detection (0-100ppm) minimum 4 Sensors CO <sub>2</sub> Detection (0-100%) N <sub>2</sub> Detection (0-100%)
<b>Primary Measurements</b>	Rate of Penetration ROP Pump Stroke Counter (3 Pumps) Stand pipe Pressure Total & Active Pit Volumes Mud Flow Out (Return Flow) On line Computer(s) / Monitor(s) Online Recorders/Online Printers D-Exponent/FPG
<b>Secondary Measurements</b>	Weight on Bit (WOB)/ Hook Load / String Weight Rotary Torque Rotary R. P. M. Casing Shut in Pressure (CSIP) Mud Weight In Mud Weight Out Mud Temperature In Mud Temperature Out Mud Resistivity In Mud Resistivity Out Trip Tank Volume Off line Computer(s) / Monitor(s) Fluoroscope Microscope Calcimetry Bulk Density Offline Suites

## **15. EQUIPMENT PERFORMANCE REQUIREMENTS**

- 15.1 The CONTRACTOR's designated unit incharge at site MUST fill and sign the Daily Equipment Checklist and MUST fax it on each Monday to Manager Mud Logging after counter signatures of COMPANY's representative at site. There will be absolutely no compromise on provision of duly signed daily equipment checklist.
- 15.2 A loss of any one parameter of (1) **Gas Measurements System** (as defined in Table 6 above) for four(4) or more hours in any 24 hour period (Midnight to Midnight) will be deducted on invoice @US\$100/each per sensor or per parameter per day till such time that the faulty sensor/parameter is repaired/replaced/calibrated and is made fully functional.
- 15.3 A loss of any one parameter of (1) **Primary Measurement System** (as defined in Table 6 above) for eight (8) or more hours in any 24 hour period (Midnight to Midnight) will be deducted on invoice @US\$50/each per sensor or per parameter per day till such time that sensor/parameter is repaired/replaced/calibrated and is made fully functional.
- 15.4 A loss of any one parameter of the **Secondary Measurement System** (as defined in Table 6 above) for 12(twelve) or more hours in any 24 hour period (Midnight to Midnight) will be deducted on invoice @US\$25/each per sensor or per parameter per day till such time that sensor/parameter is repaired/replaced/calibrated and is made fully functional.
- 15.5 The Unit Incharge of Contractor, in conjunction with the company representative, will determine if the unit qualifies for the operational day rate or if failing to meet the standards laid down above, should default to the Repair Day Rate. This will be determined at the well site using the Mud Logging QC Sheet in Table-7. This must, however, be reconciled prior to or on the end of the calendar month in question.

### **15.6 Standby Rate**

The Company shall NOT pay any kind of standby charges to the contractor for any idle periods, equipment downtime and scheduled maintenance, however, 3-days installations time and 2- days dismantling time will be paid @ established day rate of personal charges only by excluding the equipment charges.

### **15.7 Holding Rate**

The Company shall NOT pay any kind of Holding charges to the contractor for any reason, because the contract is being made on as and when required basis.

**TABLE-7: Daily Mud Logging Equipment Checklist (Mandatory)**

DATE							
EQUIPMENT							
Total Gas (0-100%)							
Chromatography(C <sub>1</sub> -nC <sub>5</sub> )							
Cutting Gas Detection							
H <sub>2</sub> S Detector (4 Sensors)							
CO <sub>2</sub> Detector (0-100%)							
N <sub>2</sub> Detector (0-100%)							
Mud Pit Level (8 pits)							
Trip Tank Level							
Pit Volume Total							
Mud Weight In (0-3 SG)							
Mud Weight Out (0-3SG)							
Mud Temperature In							
Mud Temperature Out							
Mud Resistivity In							
Mud Resistivity Out							
Mud Flow Out							
Casing shut-in pressure							
RPM							
Torque							
Weight on Bit							
Stand Pipe Pressure							
ROP							
Pump Stroke Counters-3							
Pump Strokes Totalizer							
On line Computer(s)							
Off line Computer(s)							
CRT Monitor(s)							
Printer(s)							
Online Recorder(s)							
Intercom system-5 units							
Drying Oven							
Fluoroscope							
Cuttings Blender							
Microscope							
Calcimeter							
Bulk Density							
D-Exponent/FPG							
	-Working	X-Faulty	C-Calibrated				

OGDCL REP. \_\_\_\_\_  
(SIGN & STAMP)

CONTRACTOR REP. \_\_\_\_\_  
(SIGN & STAMP)

## ELIGIBILITY CRITERIA

Sr. No	Information to be Submitted	Eligibility criteria			Information to be provided
		Qualifying Criteria	Qualifying Marks	Max Marks	
1	Company history & profile		<b>28</b>	<b>40</b>	
	No. of years since establishment	5 years 6 to 10 years 11 to 15 years 15+ years	7 8 9 10	10	
	No. of Mud Logging Units world wide	30 Nos. 31 to 40 Nos. 41 to 50 Nos. 50+ Nos.	7 8 9 10	10	
	No. of Mud Logging Units in Pakistan	2 3 to 5 5+	3.5 4.25 5	5	
	Average annual services World wider	50 51 to 75 76 to 100 100+	7 8 9 10	10	
	Average annual services in Pakistan	10 11 to 15 15+	3.5 4.25 5	5	
	2	Global experience of Mud Logging services projects in last 5 years		<b>14</b>	<b>20</b>
No. of services world wider		250 251 to 375 376 to 500 500+	7 8 9 10	10	
No. of services in Pakistan		50 51 to 75 76 to 100 100+	7 8 9 10	10	
Information of Equipment in Use			<b>7</b>	<b>10</b>	
3	Technical Rating	Within last Generation State of the art	3.5 5	5	
	Condition of Equipment	Not less than 05 years old Less than 01 years Old	3.5 5	5	
4	Global Human Resource (Pressure Engineers + Mud Logger + Geologist + Electronic Engineers + Technologists + Field Trouble shooting Engineer & Technicians)		<b>14</b>	<b>20</b>	
	Total number of Professionals	100 100 to 150 150 to 200 200+	7 8 9 10	10	
	Qualification & Experience	60% with degree in Electronics / Geology & 5 + years experience 80% with degree in Electronics / Geology & 10+ Years experience	7 10	10	
5	Global Financial Indicators (During last 5 years)		<b>7</b>	<b>10</b>	
	Average Annual Revenues	US\$30 Millions US\$30 to 100 Millions US\$100+ Millions	3.5 4.25 5	5	
	Average Annual R & D Spending	3% of profit 4 to 10 10%+	3.5 4.5 5	5	

The evaluation will be carried out on the information supplied in the table and only the applicants securing 70% or more marks in overall and in each category will be technically qualified. Applicant not meeting the lowest limit will get zero marks in that category.